ourdiu.com | Shared by Jobayer Ahmed Usamah - SWE (251)

Daffodil International University

Faculty of Science & Information Technology
Department of Software Engineering
Final Examination, Summer 2025
Course Code: MAT101
Course Title: Mathematics I
Batch: 44; Section: A-L
Teachers Initial: MMH, DMMK, MIA, GRS

Time: 2 Hours **Marks: 40**

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially]

1.	**Explain** the following terms geometrically **a.** Saddle point **b.** Inflection point	$2 \times 2=4$	CLO-1 L-2
2.	**a.** An open box is to be made from a 16-inch by 30-inch piece of cardboard by cutting out squares of equal size from the four corners and bending up the sides. **Compute** the size of the squares to obtain a box with the largest volume. **b.** **Compute** the intervals on which y is increasing and decreasing $y = 3x^4 + 4x^3 - 12x^2 - 2$ Also **compute** the inflection points, if any, of the above function.	5 6	
3.	**Calculate** the followings: a. $\int \frac{(1+x)e^x}{\cos^2(xe^x)}\,dx$ b. $\int \frac{\sin 2x}{a\sin^2 x + b\cos^2 x}\,dx$. c. $\int_0^{\frac{\pi}{2b}} e^{ax}\cos bx\,dx$ d. $\int_0^2 \int_0^z \int_0^{x\sqrt{3}} \frac{px}{x^2+y^2}\,dy\,dx\,dz$ e. $\int_0^\infty \frac{x^3}{(1+x^2)^{\frac{9}{2}}}\,dx$	$5 \times 3=15$	CLO-2 L-3
4.	**a.** **Identify** the area of the ellipse $b^2x^2 + a^2y^2 = a^2b^2$ **b.** **Identify** the area of the region enclosed between the parabola $y = \frac{3x^2}{4}$ and the line $3x - 2y + 12 = 0$.	5 5	CLO-3 L-4